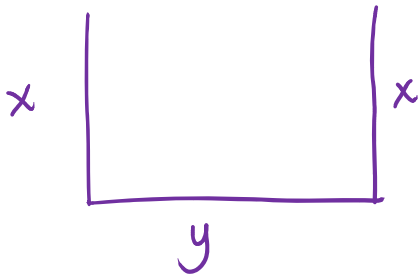


1) Old MacDonald wants to build a rectangular corral for all of his animals next to his house. When building the corral, he plans to use  $y$  feet of fence for the side parallel to the house and  $x$  feet for each of the two sides of the fence perpendicular to the house. The total length of the fence is to be 56 feet. If the area of the corral is 192 square feet, what are the dimensions?



$$2x + y = 56$$

$$y = 56 - 2x$$

$$x \cdot y = 192$$

$$x(56 - 2x) = 192$$

$$x = 24, 4$$

4 ft x 48 ft  
24 ft x 8 ft

2) You are on a boat that travels 5 miles per hour upstream and 7.5 miles per hour downstream. You are on the boat 11 hours, but cannot remember when the boat went halfway and turned around. Find the time it took the boat to go upstream and how far you traveled upstream.

	rate	time	dist
up	5	$x$	$y$
down	7.5	$11 - x$	$y$

$$5x = 7.5(11 - x)$$

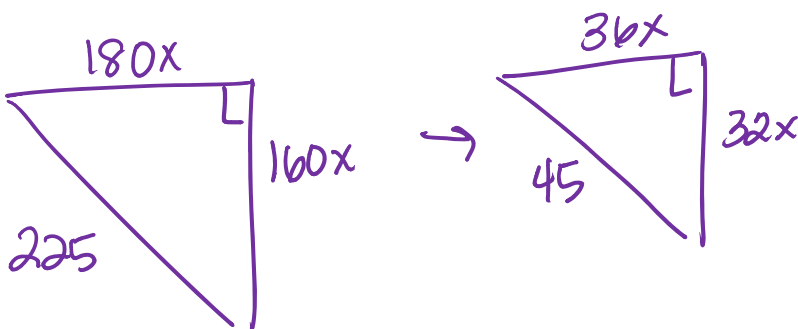
$$5x = 82.5 - 7.5x$$

$$12.5x = 82.5$$

$$x = 6.6 \text{ hours}$$

$$y = 33 \text{ miles}$$

3) Cruella deVil is at it again and Spotty, your Dalmatian, has gone missing! You are so distraught that you send out two search planes to look for it. Two planes leave O'Hare Airport at 8 p.m. One plane travels due south at 160 miles per hour while the other plane travels due west at 180 miles per hour. The planes carry radios with a maximum range of 225 miles. To the nearest minute, when will these planes no longer be able to communicate with each other?



$$(36x)^2 + (32x)^2 = 45^2$$

$$1296x^2 + 1024x^2 = 2025$$

$$2320x^2 = 2025$$

$$x^2 = 0.873$$

$$x = 0.93 \text{ hours}$$

56 minutes

8:56 AM

4) A small bottle contains 500mL of cleaning solution. The cleaner is 30% alcohol. How much distilled water would have to be added to this bottle to make it a solution that is only 18% alcohol?

$$\frac{500 \cdot 0.3 + x \cdot 0}{500 + x} = 0.18$$

$$150 = 90 + 0.18x$$

$$60 = 0.18x$$

$$333 \frac{1}{3} = x$$

5) Otter Oar has decided to start a rowing team at Hinsdale Central with his friends. During the first practice, it took Otter and his friends 1.4 hours longer to go 8 miles up the Fox River than it did to return. If the rate of the current is 0.75 miles per hour, what is the speed of the boat in still water?

	rate	time	dist
up	$x - 0.75$	$1.4 + y$	8

$$y = \frac{8}{x + 0.75}$$

down	$x + 0.75$	$y$	8
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$$y = \frac{8}{x - 0.75} - 1.4$$

$$(x - 0.75)(1.4 + y) = 8$$

$$(x + 0.75)y = 8$$

$$x = 3.02 \text{ mph}$$

6) John alone can paint a wall in 4 hours. If Barb helps, it takes only 1.6 hours. How long will it take for Barb to work alone?

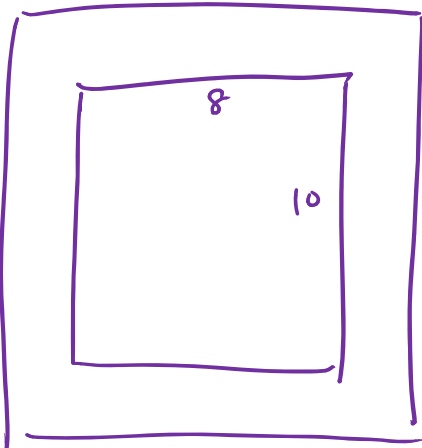
	rate	time	} 1 job
John	$\frac{1}{4}$	1.6	
Barb	$\frac{1}{x}$	1.6	

$$1.6 \cdot \frac{1}{4} + 1.6 \cdot \frac{1}{x} = 1$$

$$\frac{1.6}{x} = 0.6$$

$$x = 2 \frac{2}{3} \text{ hours}$$

7) Mrs. Green is building a picture frame for an 8 in. x 10 in. photograph. The frame is to have an equal width around the picture, and the picture will not overlap with the frame. If Mrs. Green only wants the frame to cover 92 in<sup>2</sup> of the wall, how big does Mrs. Green need to make the frame's width?



$$(8 + 2x)(10 + 2x) = 92$$

$$x = 0.32 \text{ in}$$